



## **ROLE OF ENERGY EFFICIENCY - EMPLOYMENT AND POVERTY REDUCTION**

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### **Abstract**

*Nowadays, energy from renewable energy is now becoming the current trend in providing modern energy to the people and various sustainable developmental initiatives are expected to be powered. Sustainable renewable energy will speed up the provision of modern energy for electrification and power other basic social economic activities in the rural areas and at the same time fight climate change Energy driven by renewable energy as opposed to fossil fuel energy. As local people acquire more disposable income they are then empowered to meet their basic needs constraints which inevitably lead to poverty alleviation. In India totals population is above 1000 million rated 43.5% of its families having electricity hence the government devised sustainable energy technologies and strategies which would further strengthen agricultural production, health facilities, water industries and environmental outlook besides providing local societies with electricity which enhance them to live better lives.*

*This article will explain about the importance of energy efficiency with carbon reduction methods. The project which been associated with supporting education of the younger generation through provision of favorable night study facilities and also grants opportunities for employment to indigenous people which makes such activities guaranteed of strong financial control systems that can be used to maintain future schemes. For reasons given, the Indian nation has embraced efficient use of selected fuels that reduce greenhouse gas emissions how this energy efficiency has specifically been linked to bringing down energy resource reductions along with decreasing amount of carbon emissions. Additionally, an important energy efficient strategy towards improving residential area sustainability involve instituting energy reward systems, improving environmental quality, establishing green homes, energy saving house appliances, renewable energy utility and improving public awareness on energy matters.*

**Keywords: Energy Efficiency, Sustainable Development, Carbon Reduction, Climate Change Mitigation, Employment and Poverty Reduction.**

### **Introduction**

Governments together with institutions are confronted with expanded pressure to improve on energy consumption, which has been regarded as a major component in sustainable development. Energy efficiency has specifically been linked to bringing down energy resource reductions along with decreasing amount of carbon emissions. The use of fossil fuel energy that emits carbon dioxide to the atmosphere is widely regarded as a major threat to humankind because it is causing different environmental and climate calamities and becoming less beneficial to humankind. Against this backdrop, energy would be seen to be beneficial to humankind if it is sourced from sustainable sources such as renewable sources which would invariably contribute to sustainable development, economic growth and a better standard of living of the people (Bazmi and Zahedi 2011). Various scientific reports and opinions have confirmed that sustainable renewable energy is the key to making this feasible because it is economically viable, does not emit carbon dioxide causing global climate change; it is environmentally benign and does not lead to environmental degradation or destruction (Tobing et al. 2011). Nowadays, energy from renewable energy is now becoming the current trend in providing modern energy to the people and various sustainable developmental initiatives are expected to be powered and driven by renewable energy as opposed to fossil fuel energy.

Sustainable renewable energy will speed up the provision of modern energy for electrification and power other basic social economic activities in the rural areas and at the same time fight climate change (Cherni and Hill 2009). This is the reason why it is incumbent on the government to promote sustainable development through

policies and strategy that will seek to expand the poor's access to sound energy services (Karakosta et al. 2010). Renewable energy policy is expected to deliver in three areas: energy security, climate change mitigation, and economic development (job creation). However, this is not always the case and there can be significant trade-offs among them. For instance, large biomass heat and power plants can generate new employment opportunities in rural communities, but may have a negative CO<sub>2</sub> balance due to land-use change and transportation of feedstock over relatively long distances. Similarly renewable energy is in most instances a capital-intensive activity, and energy as a whole represents a small share of employment in regional economies. Small-scale installations typically source labour and equipment from international suppliers, so the impact at the community level in terms of job creation is quite limited.

### **Energy Efficiency**

Global concern on continued exploitation of nonrenewable resources, use of inefficient technology in the production process, employment of weak structures and policies in energy consumption has been raised if an ideally sustainable future is imperative. Thus energy efficiency refer to different policies, technologies and strategies that are aimed at solving issues related to energy use whether at residential, commercial, industrial and national capacities so as to minimize emission of greenhouse gases which cause global warming together with reducing financial costs. Consequently, this practice on energy efficiency must be applicable in every sector of the economy and ultimately at national level. Therefore, as a result of clear cut absence of monitoring and control mechanisms involving energy efficient practices in governmental institutions, authors (Dai et al., 2009) explain that a properly constructed system must be adopted by all responsible governments to regulate and address this looming crisis. This introduces the need for national decision makers to develop frameworks that account energy consumption for overall economic development of the country. Naturally, trends in choosing energy tools and policies in Canada, the United States, Switzerland, Sweden and Denmark reveal that the instrument selected had strong bearing on ruling government values and beliefs, present regulative frameworks, past experiences in successful implementation of such instruments as well as general populace support (Varone and Aebischer, 2001). Therefore, whatever instrument that have been identified to account energy efficiency for any country, the resultant energy use indicators are of great importance since they are the one that denotes how a nation achieves sustainable energy development over prescribed years. The presence of many irregularities in policy and strategy of selected energy consumption instruments can work to the detriment of that country. An example in Europe was given by Eyre (1998) who supports this argument by asserting that liberalization of markets in the UK that deal with energy, has negative effects on future of energy efficiency. The impacts of such an action includes price decreases that lower incentive inducements, abandonment of regulative practices along with suppliers being given the opportunity to sell energy units in bundles, which have negative consequences on a lasting energy usage scheme (Eyre, 1998). It can be seen that freeing energy markets from government regulation through instituting supply and demand forces on the market cannot achieve sustainable energy economic emancipation as profit oriented behaviors, most of which are uneconomical and unsustainable have been promoted. Some authors have supported the idea that overall integrative energy policies at national level are capable of bringing considerable benefits to customers and the government. As observed in India, energy efficiency projects results in improved customer gains from energy savings plus public service corporation's incentive systems are able to reduce risks of unprofitable long run gains (Abhyankar and Phadke, 2012). Energy consumption frameworks at national capacity also identify sectors that are inefficient along with outlining potential threats and challenges that can be encountered in their implementation which allow governments to adapt suitably viable sustainable energy policies and tools. Sebitosi (2008) elaborates this point by saying that in South Africa, documented proposal to achieve energy savings of 12% by 2015 was deeply affected by energy crisis deficiency of 10% experienced in 2008 which required the nation to institute measures such as complete change in behavior and use of electricity by everyone, adoption of solar and other renewable sources of energy, applying energy saving methods as well as increased use of low carbon appliances. Whiles energy consumption at national level is significant for overall economic advancement of a country, the residential sector's energy usage as a sub-component of the entire system need to be examined. To that end Turiel (1997) comments that energy efficiency monitoring and performance standards in households have gained worldwide recognition from international interest groups to governmental legislative obligations in countries such as the US, China, Mexico, Canada, Philippines and Korea. Thus, it is vital



for national energy efficiency standards to be supported but is also very important to supervise energy efficiency in residential sectors since they contribute to national energy consumption totals.

Therefore methods, tools and operations that monitor energy use in residential areas of any country must be supported. Bird and Hernández (2012) explain that in the US, poor households use a lot of energy when compared to other occupants hence a well-planned adopted approach which integrates on bill financing whereby landlords make long run investment practices on their properties to improve Energy consumption standings is desirable. These activities propel landlords to realize high value gains from such investment exercises. Consequently, when applied in residential areas, energy behavior techniques in form of energy use reduction and consumption strategies along with energy modeling systems signify opportunistic ways to achieve energy efficiency (Lopes et al., 2012). Energy consumption techniques have also led to various economic benefits, reduction in fuel hardships and improved health status. Such being the case, economic gains which include improved health statuses, comfort advantages, low carbon levels as well as greater energy savings in Irish households are a result of implementing cost benefit evaluations on energy use (Clinch and Healy, 2000). As for good health levels, research conducted in Ireland demonstrates economic betterment in thermal well-being of households post-retrofit to be 10% of the full projects benefits when valued economically using computer models (Clinch and Healy, 2003). This implies advantageous private and external gain from such activities. Improved thermal health statuses of modern buildings also require developing old infrastructural buildings with advanced energy structures which optimally make use of expended energy. To support this idea Morrissey and Horne (2011) note that in Australia's households, thermal well-being is very low plus the countries energy achievement criterions reveal poor yardsticks when compared with other nations so Comprehensive ways involving upgrading existing energy systems is desirable. The initiative to improve energy structures in residential sectors have also been observed in Lithuania, as Kazakevi ius et al. (2002) utter that the Energy Efficiency Housing Pilot Project (EEHPP) was specifically designed for all buildings in private, public sectors plus residential areas in efforts to reduce energy consumption and its adoption contributes to 50% in energy savings. Thus improving energy consumption in Heating, Ventilation and Air Conditioning (HVAC) mechanisms in buildings show a "subsystem initiative" supported by producing energy savings and also ameliorated energy regulations that entails doing away with HVAC service schemes that are highly linked to cooling plus heating standards (Pérez- Lombard et al., 2012). Whilst high regard has been recognized on residential areas energy use; the industrial sector is also very important since this section accounts for most energy consumption scales for any country primarily owing to the presence of large energy intensive operations associated with heavy industries. Under these circumstances, the United States industrial sector expend 37% of energy reserves in the country and the behavior can rise if current practices are allowed to continue. Hence, an integrated system which considers various distinguishing attributes of the industrial sector from management, engineering mechanisms and industrial subdivisions is desirable to realize energy efficiency (Price and Worrell, 2001). Further condemning industrial systems as main attributors to abnormal energy use (Eichhammer et al., 2011) emphasize that the existing bottom-up framework for industrial energy needs used worldwide, present constraints to use energy efficient systems because of differences in markets, organizations consent to incur additional expenses besides involved costs in appraisals together with huge dissimilarities in technology being used in industries. Thus, it is essential to include top-down structures which involve summing up energy use of various parts of the economy by applying yardsticks on energy intensities together with identifying specific energy consumptions. Such practices establish energy efficiency patterns as well as track down particular areas that require improvements. And also, more government involvement and supervision of industrial energy needs is vital, rather than allow independent estimates to measure industrial energy consumption. Placing the importance of more stakeholder participation in accounting energy efficiency, Backlund et al. (2012) note that beneficial savings in energy can be recognized through using efficient systems, unceasingly revised and supervised energy operations along with enforced regulations adopted from linked partners rather than undertaking continued practices which seek to close the energy efficiency gap.

### **Sustainable Development**

The subject of sustainable development has been hard to interpret because of many unclear meanings and explanations it has blanketed.



A historical and abstract examination emphasizing on symbolic, presuppositions and foundations of these definitions could produce solid information on this issue (Mebratu, 1998). Thus in 1987 the Brundtland Commission report unveiled it as development that meets current needs of the present generation without depriving the needs of future generations to cater for their own needs. This shows that accountability by governments, institutions as well as individuals on how they manage their natural resources is important so that over exploitation and extinction of these resources cannot take place. Necessarily, Strong (1999) further defines it as an established, high powered and co-operative venture done by different institutions in formulating critical tools and scientific principles which predicts the future of this complex world together with restoring natural environments. This concept highlights the need to exercise control in handling available resources by introducing particular measures and monitoring patterns in resource use as well as introducing quality standards that aim to continually improve use of renewable resources. Hannoura et al. (2006) further gave weight to this approach by stating that an idealized sustainable development structure comprise of quantifiers that propel resource growth, measure trends in resource advancement and locate exercises which supervise water quality. It also investigates availability of measures that evaluate environmental impacts as well as establishing a management and analysis model. For this reason, optimal use and sustainable exploitation of natural capital must be supported in ways which do not harm the environment in addition to satisfying stakeholder concerns. Though considerable worldwide progress has been made in order to inform all stakeholders on the importance of sustainability, observed surveys still show weak structures and passive resistance in practice. As matters stand, Harding (2006) argues that the objectives of sustainable development have received spotlight attention by many stakeholders but the issue on practice has remained a struggle and a weighed down contentious subject. Thus most organizations along with some governments have not prioritized this subject as a top agenda in their main policy and strategic plans, so the initiative has been done on a very small scale. Ultimately, the blame is mostly laid on reluctant behavior of institutions top management teams as well as nations decision makers. On that account, Málovics et al. (2008) explain that sustainability practices of many organizations are still heavily embedded in their internal structures which are also done at a local scale with little or no progress in external focus. Therefore, appreciating together with widening the scope of sustainable development spearheaded by institution heads is of great importance. For this reason, sustainable development is imperative when widespread agreement on the advancement of a complete socio environmental fabrication and the individuals attached to it has been recognized (Graaf et al., 1996). The aspect of sustainability also revolves around a system which does not favor short term goals but a framework which consider long term impacts of organizational operations. Top managers and governments must be prepared to forgo immediate gains by devising plans which benefit their institutions future position. Thus, Newman (2006) unfolds that long run impact of sustainable development is admissible in its ability to continually develop and progress, focusing on lasting goal powered methodologies rather than short term operated objectives. In everyday life of many businesses, short-term goals are usually profit oriented hence is given first preference than long term targets. If organizations along with other stakeholders can do away with short-term financial benefits then sustainable development is promoted. On that account Drummond and Marsden (1995) demonstrates that sustainable development is a continuous process that is highly unpredictable and rigorous hence regulation models in industrial activities which include environmental and social measures must be introduced to administer viability of their motives at any point in time.

### **Employment and Poverty Reduction**

Energy efficient practices have led to creation of employment which enables people to receive regular income. As local people acquire more disposable income they are then empowered to meet their basic needs constraints which inevitably lead to poverty alleviation. Supporting this idea, Srivastava and Rehman (2006) notes that India, a South Asian country with population totals above 1000 million rated 43.5% of its families having electricity hence the government devised sustainable energy technologies and strategies which would further strengthen agricultural production, health facilities, water industries and environmental outlook besides providing local societies with electricity which enhance them to live better lives. Valuing the importance of electricity, the government and other stakeholders in India as noted by Bose et al. (2012) illustrates that, the Lighting a Billion Lives (LaBL) initiative by The Energy and Resources Institute (TERI), involve distributing solar energy appliances to large populations in its rural areas because it is clean, renewable and it enhance improved lighting.





This project has also been associated with supporting education of the younger generation through provision of favorable night study facilities and also grants opportunities for employment to indigenous people which makes such activities guaranteed of strong financial control systems that can be used to maintain future schemes. For reasons given, the Indian nation has embraced efficient use of selected fuels that reduce greenhouse gas emissions. Upholding this idea, D'Sa and Murthy (2004) convey that surveys in India opted for Liquefied Petroleum Gas (LPG) in place of kerosene energy sources because of minimized pollution which ensure good well-being of the people, high energy efficiency, reduced deforestation, reduced prices on the market along with reputable arrangement of marketing and distribution networks available. Supporting LPG schemes in rural areas, (McDade, 2004) substantiates that the LP Gas Rural Energy Challenge project sponsored by the United Nations Development Programme (UNDP) and the World LP Gas Association apply to rural areas of mostly third world nations by seeking to reduce energy constraints such as poor electricity provisions, reducing premature births and heavy afflictions on pregnant women carrying loads of firewood together with minimizing incidences of women being raped and infected with HIV/AIDS virus whiles collecting fuel wood. Bioenergy consumption has also been supported in India by substituting exhaustible fuels such as kerosene. For that reason, Batliwala and Reddy (2003) comment that a Biogas project was erected in Pura, a rural settlement in India in order to assist alleviating energy problems women encounter which enable them to become business minded and increase their involvement by becoming managers. The challenges women faced included expending lots of time finding fuel wood, discharging jobs that cause back damages and they were also exposed to fuels such as firewood which cause serious health respiratory problems. Moreover, Larson and Kartha (2000) named bioenergy the "the poor woman's oil" since it offers favorable income-producing conditions, women are no longer assuming difficult tasks such as carrying water and firewood, crushing grain using hands and cooking in smoky places. It has also been involved with championing the well-being of the environment through reduced emission of greenhouse gases, minimized deforestation, waste from the plant can improve agricultural soil nutrient contents by stabilizing its alkalinity and adding vital nutrients. In that way, adopting cheap fuel from bioenergy results in associated energy poverty issues being alleviated. In pursuit to determine the degree to which energy consumption has led to reduction in energy poverty matters, different scientists have developed suitable frameworks. Solid evidence from projects that aim to diminish poverty associated with energy access on the South American continent has also been pinpointed. Pereira et al. (2010) establishes that projects in Brazil aimed to correct social energy poverty deficiencies encouraged minimized government involvement, supported building up of energy regulatory frameworks, relaxation of energy market forces along with establishing autonomous entities mandated to supply rural electric power. Consequently, the country's effort to attain sustainable energy growth led decision makers to devise sustainable national policies on energy. Soares et al. (2008) stress that the National Energy Outlook (NEO) 2030 in Brazil indicates that the country possess great potential in exploiting non exhaustible sources of energy that will propel positive effects on access to energy by its people thereby raising their standards of living, offering employment which improve financial status as well as increase innovation of productive energy components. In Europe, policies and strategies which seek to address energy poverty matters have also been enforced. Under these circumstances, Bouzarovski et al. (2012) approve that the European Union guiding principles and courses of action associated with reducing energy poverty include designing suitable energy and directive paths, erecting unified energy frameworks as well as establishing a European Energy Poverty Monitoring Center. By adopting some of these objectives Poland have benefited from sustainable energy practices.

Szyma ska and Chodkowska-Miszczuk (2011) make clear that Poland's rural locations optimize crop waste through developing bio-energy which allows movement of knowledge and expertise to other parts of the country or even internationally in addition to creating jobs for the youths who have become very innovative and highly productive. This growth in utilizing energy consumption by making it sustainable has also recognized substantial positive benefits for the German economy. Schlör et al. (2012) specifies that investigative reports in Germany illustrated that sustainable energy frameworks and strategies result in improved distribution of income, high quality of life, better social union between the government and people together with achieved good image in international obligatory duties when championing such projects. In Africa and other parts of the world recognizable benefits which results from reduction in energy poverty levels have also been ascertained. On that account, Ogola et al. (2011) informed that the effects of Geothermal projects on Millennium Development Goals

(MDGs) in Kenya's villages of Baringo lowlands have been substantiated as increased supply of electricity to households and educational institutions, improved local people entrepreneurship, availability of substitutable sources of income so girls aren't given out for marriage at young ages, empowers health and other business institutions, promotes zero carbon emission targets and allow global transfer of scientific innovations and practices. Thus such developments promote overall growth of the economy. Supporting the role of renewable sources of energy towards complete advancement of a nation, Michalena and Tripanagnostopoulos (2010) says that that adoption of solar energy frameworks on Mediterranean Islands achieved the purpose to positively transform the tourism industry.

Therefore, by meeting tourist's expectations, boost in local community development through created employment opportunities together with increased entrepreneurship of indigenous people is achieved which ultimately reduces poverty.

### **Suggested Additional Strategy**

In urban area energy efficient sustainability, the aim of the extra approach on sustainable development entails achieving energy efficiency by building major energy planning fundamentals that must be shown in development plans pertaining urban areas since they consume much energy than rural communities. Energy efficient strategy for urban residential setting sustainability

### **Energy Reward Systems**

These refer to payoffs done on households that show worthy energy behavior and consumption. The main purpose of such honors is to motivate residents to develop attitude and conduct that propel energy efficiency. Thus it is the duty of energy providers to award residents who excel on energy matters. Such a framework can be devised over a monthly or annual basis. On that account, it is important to give good and valuable prizes to winners so that other residents are stimulated to adopt energy efficiency behavior which produces increased competition among energy them thereby achieving sustainability.

### **Improve Environmental Quality**

These are practices that allow all weather components to actively assume their role in homes. These weather elements are temperature, humidity and wind. For these elements to optimally exercise their function, urban households should be built with natural resource material since they are environmentally friendly. Thus energy regulation in the house can be maintained during both winter and summer times thereby accomplishing energy efficiency.

### **Green House**

It is increasingly important to introduce systems that promote a low carbon environment in urban households. Thus, planting small trees, plants, flowers and lawns assist in absorbing carbon quantities in the atmosphere inevitably improving energy performance. Roofs and walls of houses can also be put earth soil and then green lawns will be planted which further moderate temperatures within the house which achieve energy efficiency.

### **Public Awareness Programmers**

Governments through their energy providers must introduce structures that will improve people's knowledge on energy saving matters. Some household are ready to adopt energy efficiency practices but they lack knowledge on how to integrate such activities in their everyday lives. It is the duty of government to erect frameworks that will realize people acquiring adequate education and training on energy issues through attending conferences, undergoing energy based courses as well as embarking on extended energy public alertness campaigns.

### **Energy Saving Home Appliances**

These are practices that ensure that kitchen, lounge, laundry and bedroom electric equipment such as stoves, washing machines, geysers, lamps, microwaves and refrigeration devices minimize energy consumption. Therefore, energy efficiency is achievable through switching off equipment that is not in use. And also, improved

time management in using household gadgets could help considerably in saving and optimizing available electricity as it will not result in wastage. It is therefore, advisable to purchase electric equipment that is fitted with timers. Additionally, households can purchase Aluminium made kitchen tools since they absorb heat faster when cooking then use earthenware tools to warm the food since they are able to retain heat for a long period of time which save a lot of energy that can be consumed. Furthermore, centralizing house facilities in one place can also assist in saving energy. For instance, entertainment appliances such as televisions can be put in a single place instead of distributing them across the house.

### **Renewable Energy Utility**

It involves introducing electricity in homes using technology that is supported by non-exhaustible sources of energy. For example, use of solar powered panels help to minimize carbon emission since they produce clean energy. Electricity from solar powered panels can also assist in load shedding conventional electricity from energy providers. Moreover, solar power can be utilized during the day and then latter substituted with the normal electricity services during the night (where consumption is also monitored) so as to optimize generation of clean electricity.

### **Conclusion**

Energy efficiency undertakes major functions on sustainable emancipation of institutions and countries. It has become very important to substitute fossil fuels with renewable sources of energy as they have been linked to significant reduction in carbon emissions, mitigate climate change as well as solve many challenges associated with energy poverty. However, it must be emphasized that exploitation of non-exhaustible sources of energy is only sustainable if they are consumed in ways that do not cause damage to existing environments. Thus, weak energy policies as well as inefficient energy technology contribute to unsustainability even when renewable sources of energy have been adopted. Additionally, an important energy efficient strategy towards improving residential area sustainability involve instituting energy reward systems, improving environmental quality, establishing green homes, energy saving house appliances, renewable energy utility and improving public awareness on energy matters. On that account, a sustainable future is imperative when sound structures that address energy consumption matters have been established, implemented and adequately furnished with clear monitoring and regulative frameworks.

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